

Health-Based TPH Closure Levels in RISC



Background

- Petroleum is the single most common environmental contaminant in Indiana
 - Gasoline
 - Diesel
 - Heating oils
- Collectively referred to as Total Petroleum Hydrocarbons (TPH)

What is TPH?

- Typical HC fuels composed of compounds with carbon chain lengths from C5 – C36
- Composition varies depending upon:
 - Type of fuel (i.e. gasoline, diesel, heating oil, etc)
 - Crude oil feedstock
 - Season (fuels blended for seasonal performance)
 - Geographic region (east coast, west coast, etc.)
 - Performance based – no particular formula



Currently in Indiana (LUST '94 Guidance)

TPH in soil

- 100 mg/kg on site
- 20 mg/kg off site
- TPH not differentiated by fuel type

COCs in soil and ground water (health based,
MCLs)



Dilemma

- ❑ Many sites achieve COC closure levels, but still exceeded TPH in soil
- ❑ Can't close the site, even if it doesn't present an obvious health or environmental threat
- ❑ IC 13-12-3-2 requires health based closure levels (as in RISC)



RISC Features

- Health based closure levels
 - Residential and Commercial/Industrial exposures
 - Soil and ground water
- Default and Nondefault



Default - Nondefault

□ Default

- Conservative closure levels that can be applied to most sites with a minimum of effort

□ Nondefault

- Closure levels based upon site specific parameters
- Greater effort involved than for default
- Higher closure levels than the default



TPH Health Based Dilemma

- TPH a mixture of >250 compounds
- Impractical to quantify each compound
- Detailed chem/phys/tox info on ~ 25 of these compounds



Health Based TPH Approaches

- Massachusetts DEP 1997 – 2002
- TPHCWG (EPA, Industry, Academia) 1998-99
- Washington DOE 2001
- Indiana DEM 2001 - 2006 (RISC based)

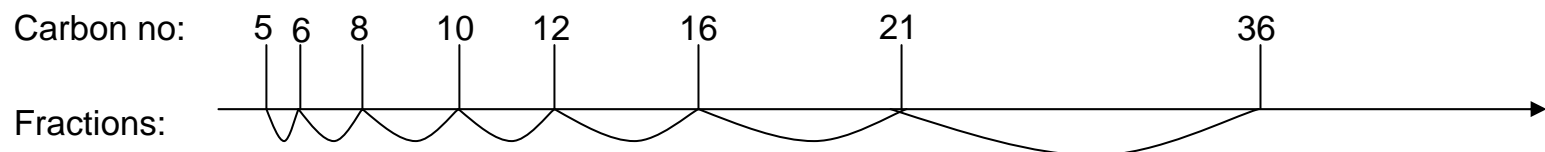


TPH Fractionation

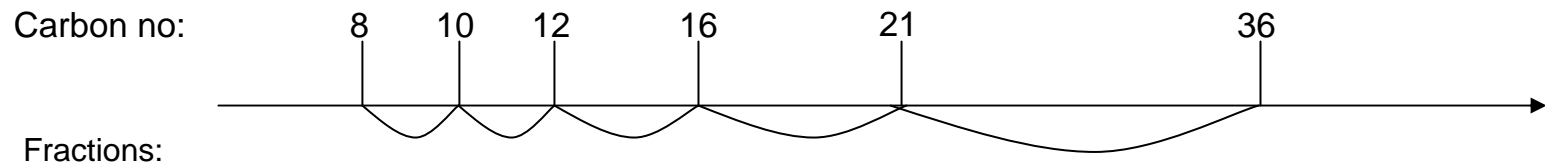
- Divide TPH into 12 fractions based upon:
 - Aliphatic compounds (7 fractions)
 - Aromatic compounds (5 fractions)
 - Carbon chain lengths
 - Similar physical/chemical characteristics

TPH Fractions

Aliphatic



Aromatic





TPH Fate and Transport

- Each fraction's behavior in the environment determined by fraction specific physical/chemical factors
- Modeled as if the entire fraction were a single compound



TPH Toxicity

- ❑ A surrogate compound represents the toxicity of a fraction
- ❑ Followed NCEA's recommendations for surrogates
- ❑ TPH closure level is based upon the sum of the individual fraction's toxicity



Default TPH Closure levels

- On site (commercial/industrial)
 - Gasoline: 330 mg/kg in soil; 3.0 mg/l in ground water
 - Diesel: 1,000 mg/kg in soil; 1.1 mg/l in ground water

- Off site (residential)
 - Gasoline: 25 mg/kg in soil; 0.22 mg/l in ground water
 - Diesel: 80 mg/kg in soil; 0.10 mg/l in ground water

- COCs in soil and ground water



Nondefault Closure Levels

- ❑ Health based, site specific, determination of contaminant closure levels
- ❑ Based upon analysis of the petroleum contaminant present on site

Nondefault Fractionation Analysis

- Using Washington Department of Ecology's VPH/EPH methods
 - <http://www.ecy.wa.gov/biblio/97602.html>

- Suggest using labs that are familiar with WDOE's analytical methods
 - http://www.ecy.wa.gov/programs/eap/labs/labs_main.html

Fractionation

- ❑ Fractionate 3 – 5 samples from the most contaminated area
 - Closure levels determined using IDEM's spreadsheet (will be posted on the RISC Web Site)
 - Use the lowest CL for the site CL
- ❑ Use standard GRO/ERO (SW 846-8015) analyses for determining N&E and PEC on the site



Important Notes

- ❑ TPH regulated as the sum of the individual fractions, not by each fraction
- ❑ TPH closure levels for soil and ground water
- ❑ COCs still need to be evaluated separately
- ❑ Fractionation only used to determine nondefault closure levels
- ❑ N&E and PEC can still use cheaper GRO/ERO (SW 846-8015)



Status Report

- ❑ A draft TPH Chapter for the RISC Technical Guide has been completed
- ❑ The draft was sent out for a 45 day public comment period: (March 15 – May 1, 2006)
- ❑ The draft is posted on the agency website at:
<http://www.in.gov/idem/rules/policies/>



Status Report

Comments should be sent to:

Glynda Oakes

IDEM Office of Land Quality

100 N. Senate Avenue

Indianapolis, IN 46204



Status Report

- ❑ The TPH NPD will be presented to the Solid Waste Management Board at their May 16, 2006 meeting.
- ❑ If approved by the Board, the NPD will become effective 30 days later (June 14, 2006)

Contact For More Information

- Contact Bob Moran

- IDEM, OLQ, Science Services Branch, 100 N. Senate, MC 66-20 IGCN 1101, Indianapolis, IN 46204-2251
- 317-232-4419
- bmoran@idem.in.gov

- Check the RISC web site

- <http://www.in.gov/idem/land/risc/>

For Information on LUST Program

- Contact Craig Schroer
 - IDEM, OLQ, Remediation Services Branch, 100 N. Senate, MC 66-20 IGCN 1101, Indianapolis, IN 46204-2251
 - 317-234-0974
 - cschroer@idem.in.gov
- Check the LUST web page
 - <http://www.in.gov/idem/land/lust/index.html>